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GB 1557372
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GB 535377
GB 161370
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(54) **A mat and similar fabrics made of textile fibres, treated for improved adherence, for use in plastic material structures**

(57) A mat or similar fabric made of textile fibres for use in plastic material structures, has filaments, hairs, swellings, surface discontinuity and generally speaking means of providing adherence for outer plastics layers, obtained both by weaving with threads made by spinning "flock" and by subjecting the mat to a suitable mechanical or chemical process. The object is to provide a mat for impregnation which has sufficient 'bulk' or 'hairiness' to be bonded to the plastics material, to prevent delamination upon the receipt of a heavy blow. The mechanical process may be carding, emery-polishing, teazling or bulking. As shown in Fig. 7, the fabric 17 may be passed between two rollers 28, 29 covered with pointed elements 26, 27, 30, 31 to produce surface hairs or filaments 23, 24.

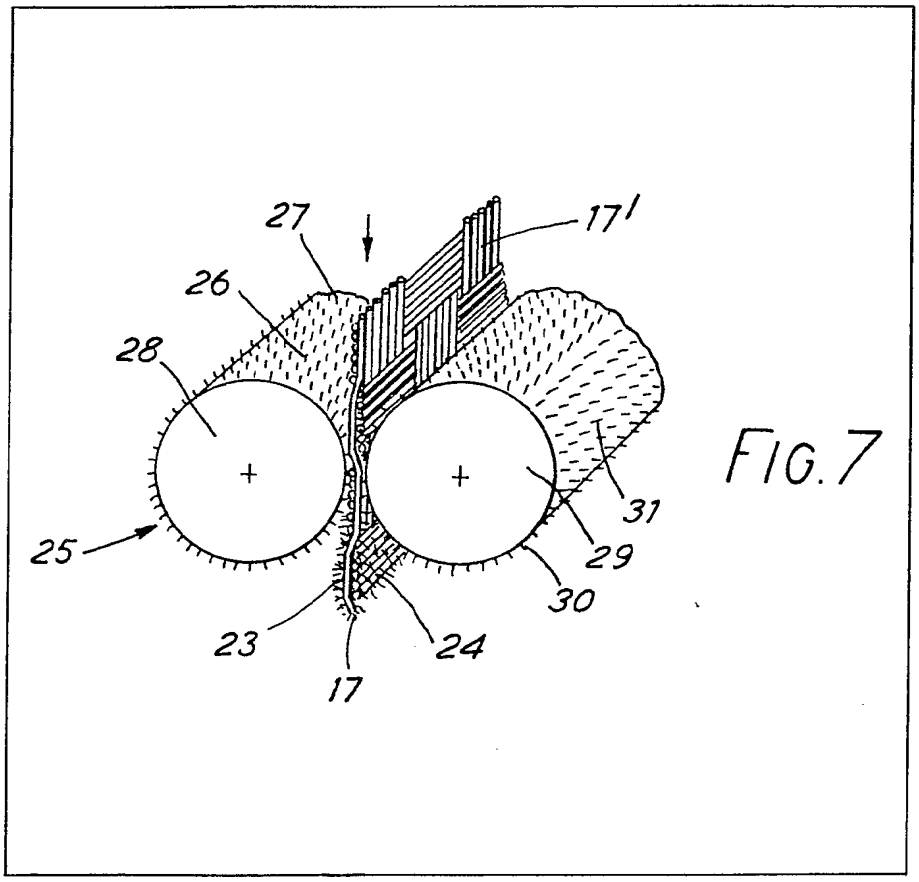

FIG. 7

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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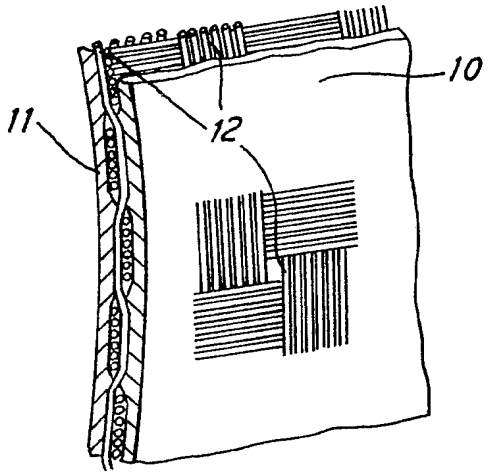


FIG.1

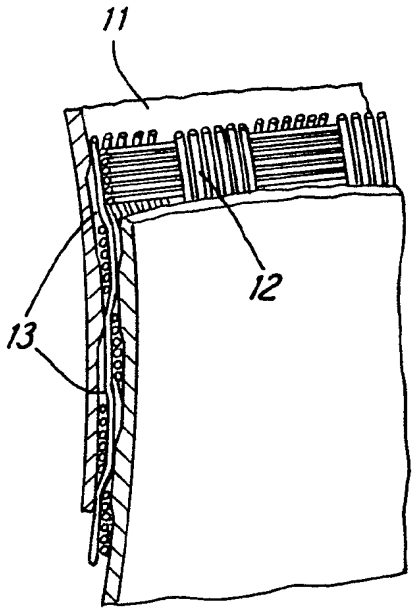


FIG.2

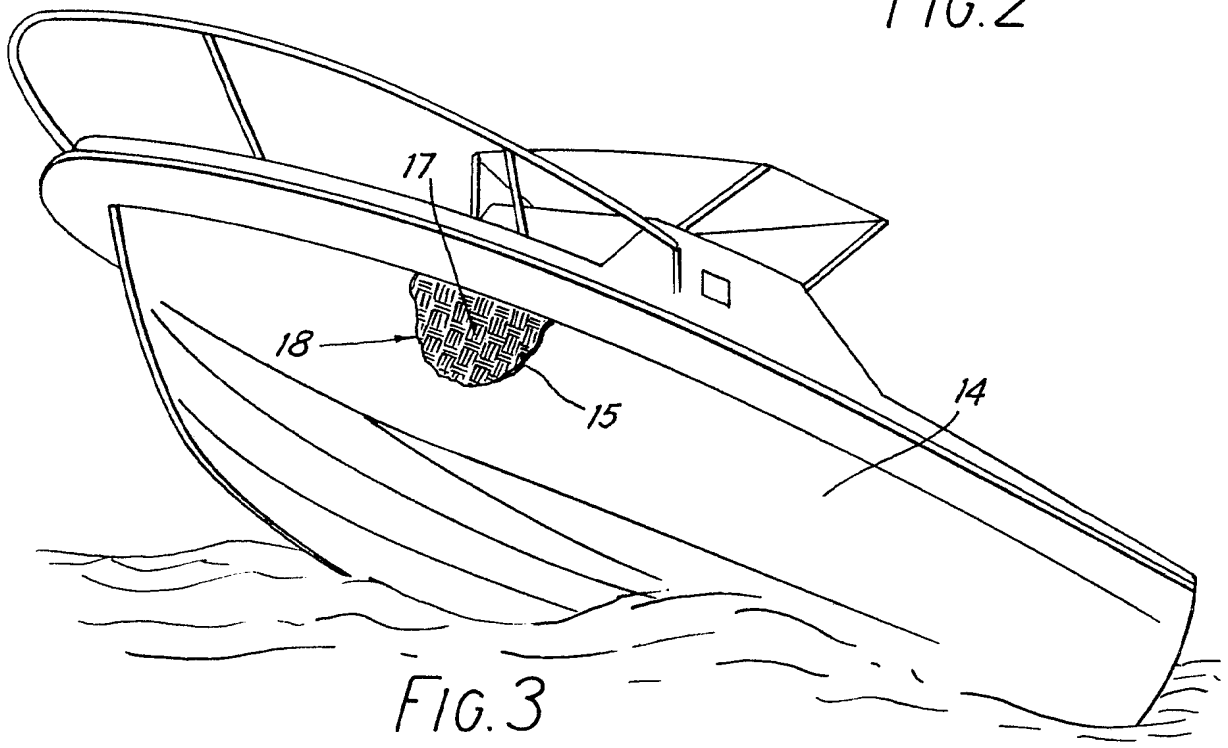


FIG.3

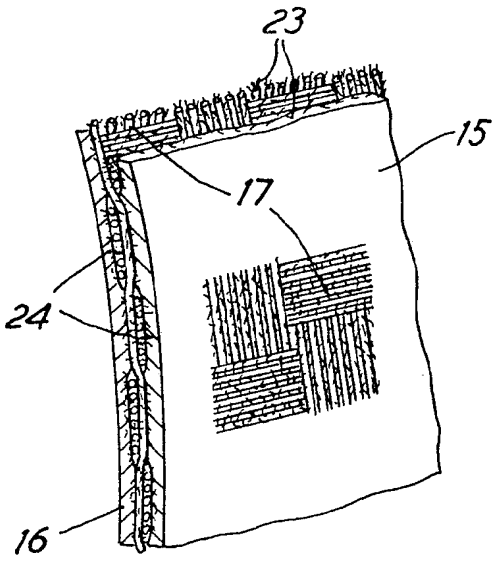


FIG. 4

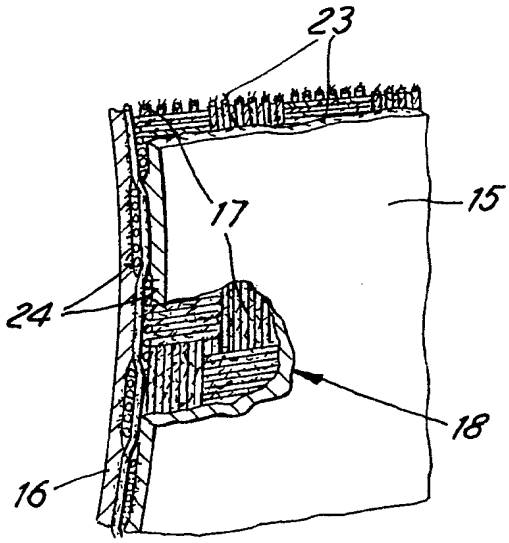


FIG. 6

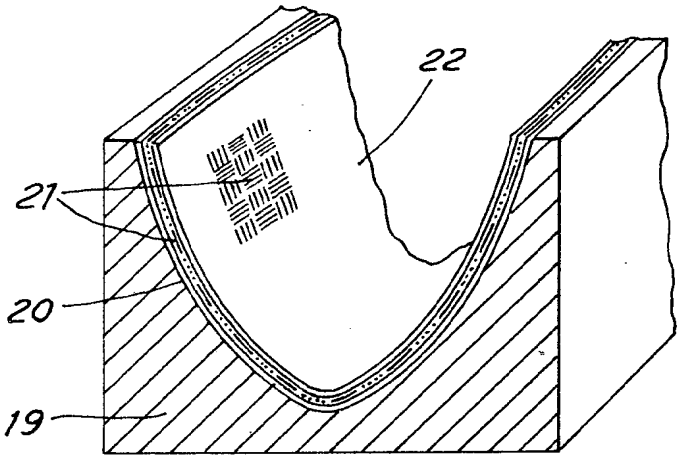


FIG. 5

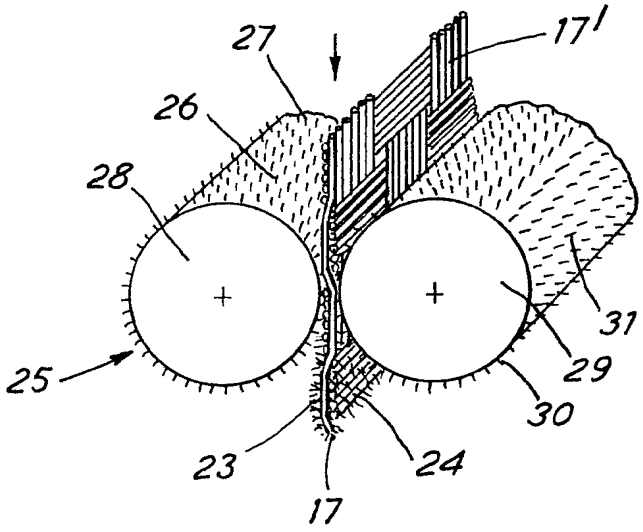
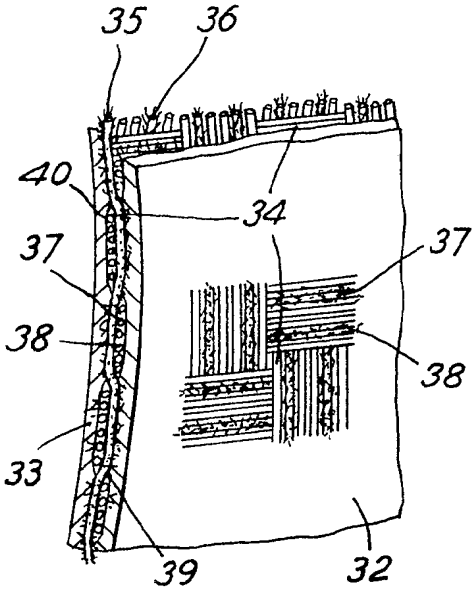


FIG. 7

FIG. 8



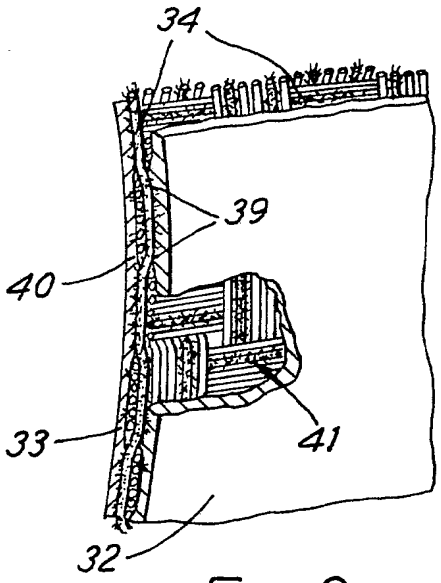


FIG. 9

SPECIFICATION

A mat and similar fabrics made of textile fibres, treated for improved adherence, for use in plastic material structures

A commonly used structure is that consisting of outside layers of plastic material and of an internal layer of a fabric such as textile matting of some kind. These structures are used in many fields such as building, boats, vehicles, sports articles, furnishing, frameworks and others.

The bodywork is generally made of polyester, epoxy, phenolic, silicone, polyethylene, cellulose and elastomer resins.

The matting is substantially speaking a fabric made of natural (animals, vegetable, mineral) and synthetic (polypropylene, polyvinyl, polyester, polyammide, polyurethane) textile fibres.

The structures described involve a considerable number of disadvantages. In the case of the materials that are most commonly used, the strongest, most resilient and least expensive, the following situations occur:

The fiberglass gives poor adherence to the outer layers of polyester and epoxy resins, under severe stresses it tears badly, it absorbs a great quantity of resin and its weight is considerable.

As fiberglass possesses little elasticity, following heat shrinkage, more or less marked signs of surface discontinuity appear.

Another point to note is the relatively high cost of epoxy resins.

The above invention eliminates or reduces the above disadvantages offering other considerable advantages as will be described below.

The invention envisages the formation of mats with filaments, hairs, depressions, swellings, cracks in the surface, means of adherence generally obtained as follows:

—"discontinuous" threads used partially or entirely to make the fabrics forming the mats; such threads are obtained from spinning polyester flock, or any other flockable material, namely threads with a high number of filaments;

—the mats are given a physical and chemical treatment so as to "deflock" the threads and create lumpiness, roughness and superficial discontinuity.

The physical processes include treatment similar to the so-called "carding", emery-polishing, teazling, "bulking" and the like.

The chemical processes consist in application of suitable aggressive substances to the textile fibres such as will break up surface continuity by creating filaments, fraying, lumpiness and suchlike.

Due to the effects of these treatments the mat and similar things take on even a "furry" or puffed-out appearance or something similar. The hairs, filaments, lumps and surface discontinuity, the means provided to assist adherence generally, creating a kind of lateral ramification of the various hairs and threads, penetrate into the resin stuctures thus eliminating or reducing delamination and weakening of the fibres. This makes the structures themselves lighter, tougher, easier to glue, stronger and more resilient and reducing the number of layers required. If a hole is made in the side the armature underlying the first layer of resin generally remains intact and it is therefore an easy matter to recreate layer continuity.

As in particular this invention facilitates the glueing together of the various component parts, their adhesion and the creation of a strong and penetrating type of bond between mats and matrix, one actually being incorporated into the other, an optimum association can be obtained with mats made of any type of fibre, polyester fibre included.

In this way it has been possible to benefit by all the positive characteristics and well-known advantages offered by the polyester resins compared with other types. A particular advantage of the polyester thread is that it will become impregnated with resins even without a "bridging" agent, and does not tend to absorb water.

This invention also makes it possible to superimpose one mat over another without having to place to another layer (specially of felt woven with threads fixed together with resins or equivalent products) generally used to increase adherence between the layers of resin.

It is also possible to replace mineral fibres (without however losing hardly any of their qualities) thus avoiding the irritating effects they often cause in people and things generally due to their tendency to pulverise.

Fig. 1 Detail of a hull of polyester resin built with an ordinary fiberglass mat.

Fig. 2 The same cross section after having received a heavy blow.

Fig. 3 A boat with a polyester hull build with mats as described herein.

Fig. 4 Detail of the hull shown in Fig. 3.

Fig. 5 Diagram to show how a hull is built.

Fig. 6 The same cross section as in Fig. 4 after a heavy blow.

Fig. 7 Drawing to show how rougheners are used to de-flock and rough up the surface of the mat.

Fig. 8 Detail of a hull made from polyester resins with polyester fibre mats about half of whose component threads are non-continuous, namely obtained by spinning polyester flock.

Fig. 9 The same cross section after receiving a heavy blow.

Fig. 1: The hull structure consists of an outer (10) and inner (11) layer of polyester resins and of a mat (12) woven from continuous threads of fiberglass.

Fig. 2: The same structure as in Fig. 1 after receiving a heavy blow causing serious delamination between layers and the various cavities (13) with the risk of a break right through that might sink the boat.

Fig. 3: This shows a hull (14) made of polyester throughout, namely both the outer (15) and inner (16) layers and the mat (17). The mat has been given a "physical" treatment as here invented,

which has caused the threads to de-flock and fray forming the filaments and hairs like (23) and (24) shown in Fig. 4. The method followed for building the hull is practically the same as seen in Fig. 5.

A concave shape has been cut in the wooden form (19) and an initial layer (20) has been sprayed into it followed by the mat (21) made of polyester fibres and a further layer of polyester resin (22).

Fig. 6 shows a cross section detail of the same part of the hull in Fig. 4 after it was violently hit. Here it can be seen that layers (15) and (16) and the mat (17) remained all in one piece due to the presence of filaments and hairs (23) and (24) and other roughness. The superficial damage (18) done to the first layer (15) did not injure the mat (17) and can therefore easily be repaired. The carding device (25) sketched in Fig.7, or something similar, has de-flocked (17, 17') the mat and caused the superficial roughness already described, namely the filaments and hairs (23) and (24), created by the two rollers (28) and (29) the surfaces of which are covered with pointed objects (26), (27) and (30), (31).

Fig. 8 illustrates the cross section of a hull made of two polyester resin layers (32) and (33) reinforced by a polyester mat (34) woven of non-continuous threads (35), (36), (37), (38), and of others having filaments and hairs (39), (40) and other things. After a violent blow (Fig. 9) the layers were practically unmoved and as before thanks to the filaments (39), (40) and other hair-like projections which penetrated deeply into the inner and outer layers (32) and (33). The superficial damage (41) did not affect the mat and could easily be repaired.

As the applications of the invention have been described only as examples of its use and are in no way limited to these, it is understood that any equivalent application of the inventive concepts here set forth, and any product made and/or put into use in accordance with the characteristics of the invention will be covered by its field of protection.

CLAIMS

1. A mat, and similar article, woven of textile fibres for use in plastic material structures, characterized by the fact that it possesses filaments, hairs, depressions, swellings, cracks in the surface and means providing adherence generally which determine a more effective and closely knit connection permitting the mat to penetrate into the surrounding structure, also permitting the use of polyester textile fibres between two layers of polyester resin, association with other mats even without interposition of the felt layer, and involving other advantages such as abolition of "bridging agents" and replacement of mineral fibres with others.

2. A mat as in claim 1, characterized by the fact that the means of adherence are obtained both using threads made by spinning "flock", namely non-continuous threads possessing a large number of filaments, and by submitting the mat to physical and chemical processes.

3. A mat as in claim 2, characterized by the fact that the physical process consists of subjecting the mat to the action or carding devices or other similar ones able to do carding, roughening, teazling, bulking and swelling.

4. A mat as in claim 2, characterized by the fact that the chemical process consists of application of chemicals able to react with the fibres, threads and fabrics breaking up superficial continuity and producing the effects already described, or similar or equivalent effects.

5. A mat as in claim 1, characterized by the fact that although it offers advantages when made of any type of textile fibre and when used with structures of any type of resin, it is especially made of polyester fibres and applied within polyester resin structures.

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